



SLOVENSKI STANDARD
SIST-TP CEN/CLC/TR 17603-10-03:2022
01-oktober-2022

Vesoljska tehnika - Smernice za preskušanje

Space engineering - Testing guidelines

Raumfahrttechnik - Prüfrichtlinien

Ingénierie spatiale - Lignes directrices pour les essais

Ta slovenski standard je istoveten z: CEN/CLC/TR 17603-10-03:2022

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ICS:

49.140 Vesoljski sistemi in operacije Space systems and
operations

SIST-TP CEN/CLC/TR 17603-10-03:2022 en,fr,de

TECHNICAL REPORT

CEN/CLC/TR 17603-10-03

RAPPORT TECHNIQUE

TECHNISCHER REPORT

August 2022

ICS 49.140

English version

Space engineering - Testing guidelines

Ingénierie spatiale - Lignes directrices pour les essais

Raumfahrttechnik - Prüfrichtlinien

This Technical Report was approved by CEN on 16 August 2021. It has been drawn up by the Technical Committee CEN/CLC/JTC 5.

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Table of contents

European Foreword	10
Introduction	11
1 Scope	12
2 References	13
3 Terms, definitions and abbreviated terms	15
3.1 Terms from other documents	15
3.2 Terms specific to the present document	15
3.2.1 dummy	15
3.3 Abbreviated terms	16
4 General requirements	21
4.1 Test programme	21
4.1.1 Test programme basics	21
4.1.2 Specific tests	23
4.1.3 Risks during testing	23
4.1.4 Overtesting	24
4.1.5 Test effectiveness	25
4.2 Development test prior to qualification	25
4.3 Test management	26
4.3.1 General	26
4.3.2 Test reviews	27
4.3.3 Test documentation	29
4.3.4 Anomaly or failure during testing	40
4.3.5 Test data	40
4.4 Test conditions, input tolerances, and measurement uncertainties	41
4.4.1 Test conditions	41
4.4.2 Test input tolerances	42
4.4.3 Measurement uncertainties	42
4.5 Test objectives	45
4.5.1 General requirements	45

4.5.2	Qualification testing.....	45
4.5.3	Acceptance testing.....	45
4.5.4	Protoflight testing	46
4.6	Retesting	46
4.6.1	Overview.....	46
4.6.2	Implementation of a design modification after completion of qualification.....	46
4.6.3	Storage after protoflight or acceptance testing	46
4.6.4	Space segment element or equipment to be re-flown.....	46
4.6.5	Flight use of qualification Space segment element or equipment	47
5	Space segment equipment test requirements	48
5.1	General requirements	48
5.2	Qualification tests requirements.....	49
5.3	Acceptance test requirements	49
5.4	Protoflight test requirements	49
5.5	Space segment equipment test programme implementation requirements	50
5.5.1	General tests.....	50
5.5.2	Mechanical tests	53
5.5.3	Structural integrity under pressure tests.....	56
5.5.4	Thermal tests	57
5.5.5	Electrical/RF tests	87
5.5.6	Mission specific test	88
6	Space segment element test requirements	89
6.1	General requirements	89
6.2	Qualification tests requirements.....	89
6.3	Acceptance test requirements	90
6.4	Protoflight test requirements	90
6.5	Space segment element test programme implementation requirements	90
6.5.1	General tests.....	90
6.5.2	Mechanical tests	113
6.5.3	Structural integrity under pressure tests.....	117
6.5.4	Thermal test.....	117
6.5.5	Electromagnetic test.....	134
6.5.6	Mission specific tests	135
6.5.7	Crewed mission specific tests	135
7	Pre-launch testing	137

CEN/CLC/TR 17603-10-03:2022

Annex A Mechanical tests	138
A.1 Foreword	138
A.2 Physical properties measurements	138
A.3 Static Test	143
A.4 Spin test	156
A.5 Centrifuge test	159
A.6 Sine burst test.....	161
A.7 Sinusoidal vibration test.....	165
A.8 Random vibration testing	177
A.9 Acoustic testing	182
A.10 Shock testing	188
A.11 Thermal distortion test	188
A.12 Gravity release test.....	193
A.13 Micro-vibration environment verification by test	194
Annex B Structural integrity under pressure tests.....	212
B.1 Foreword	212
B.2 Leak test.....	214
B.3 Proof pressure test.....	220
B.4 Pressure cycling test.....	221
B.5 Design burst pressure test.....	223
B.6 Burst test	224
Annex C Audible noise test	226
C.1 Space segment equipment audible noise emission test.....	226
C.2 Space segment element audible noise emission test.....	230
Annex D PIM tests	234
D.1 PIM – guidelines for equipment testing	234
D.2 PIM – guidelines for payload testing	240
D.3 PIM – Guidelines for Element testing	247
Annex E Alignment measurements	251
E.1 Purpose	251
E.2 General.....	251
E.3 Test configuration and test aspects	254
E.4 Test preparation	259
E.5 Test execution	260
E.6 Test evaluation	264
E.7 Other alignment methodology.....	264

Annex F List of test bench names	265
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Annex G Referenced documents	267
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Figures

Figure 4-1: Testing at S/C level and example of typical EGSE setup for JUICE S/C (courtesy Airbus Defence and Space)	31
Figure 4-2: GOCE spacecraft Container	33
Figure 4-3: Exomars Schiaparelli Descent Module Container	34
Figure 4-4: AEOLUS multipurpose trolley	34
Figure 4-5: Lifting device for Exomars Schiaparelli Descent module	35
Figure 4-6: Test input in-tolerance or out-of-tolerance assessment (decision rule)	43
Figure 4-7: Conformity assessment with the guard bands approach (decision rule)	44
Figure 5-1: Relation between FFT, PT and RFT on equipment level	50
Figure 5-2: Unit TRP and Boundary Temperatures (conductive ITP and T_{Sink})	60
Figure 5-3: Thermal vacuum test profile (example n° 1 for "type a" units)	66
Figure 5-4: Thermal vacuum test profile (example n° 2 for "type a" units)	66
Figure 5-5: Hot plateau TRP temperatures drive (including "type a" units switch-on)	70
Figure 5-6: Cold plateau TRP temperatures drive (including "type a" units switch-on)	71
Figure 5-7: Unit temperature cycling mechanical and thermal configuration	74
Figure 5-8: Some common examples of equipment flight accomodation	77
Figure 5-9: Temperature controlled support and test set-up representativeness	80
Figure 6-1: Mapping of previous and current test terms in the ECSS-E-ST-10-03 standard	92
Figure 6-2: Typical sequence of tests for element level functional verification	96
Figure 6-3: Logical relationship between FFT-D (or FFT-Q), FFT-W(or FFT-A) and RFT	99
Figure 6-4: Logical relation between model, test bench, test campaign, test item (IUT), test environment and test infrastructure	102
Figure 6-5: Example of an SVF based on the mapping between ECSS-E-ST-10- 02C/03C and ECSS-E-TM-10-21A	103
Figure 6-6: Example of solar generator unloading device for Sentinel 2	106
Figure 6-7: Exomars TGO antenna offloading device	106
Figure 6-8: Top-level AOCS Control Chain Schematic	110
Figure 6-9: Fit check of Galileo Spacecraft with the launch dispenser	113
Figure 6-10: Example of a thermal vacuum test profile for a space segment element	121
Figure 6-11: Unit TRP temperature control bands during space segment element plateaux	123
Figure 6-12: Unit TRP temperatures drive feasibility (example of a P/F equipment bay)	125

CEN/CLC/TR 17603-10-03:2022

Figure A-1 : CoG measurement along 1st lateral axis	139
Figure A-2 : CoG measurement along 2nd lateral axis	140
Figure A-3 : CoG measurement along vertical axis.....	140
Figure A-4 : M80 physical properties measurement machine with Bepi-Colombo MCS at ESTEC	141
Figure A-5 : WM50/6 combined CoG and Mol measurement machine with IXV STM	142
Figure A-6 : WM50/6 combined CoG and Mol measurement machine with Goce PFM	142
Figure A-7 : Rack static test configuration-1/4	146
Figure A-8 : Rack Static tests configuration-2/4	146
Figure A-9 : Rack Static tests configuration-3/4	147
Figure A-10 : Rack Static tests configuration-4/4	147
Figure A-11 : Automated Transfer Vehicle (ATV) primary structure test article	149
Figure A-12 : Setting of ATV primary structure static test	150
Figure A-13 : ATV static test fixtures: “Base” to constrain the test article and “Tower” to support the internal jacks	151
Figure A-14 : ATV static test: internal loading jacks arrangement.....	152
Figure A-15 : ATV static test: internal loading jacks details.....	153
Figure A-16 : ATV static test: external view and external loading jacks	154
Figure A-17 : ATV static test: layout of the displacement transducers	155
Figure A-18 : Dynamic balancing facility installed in a vacuum chamber (Large Space Simulator at ESTEC).....	157
Figure A-19 : Meteosat Flight Model during spin test.....	157
Figure A-20 : GPM spacecraft undertakes centrifuge test at Goddard (courtesy of NASA).....	160
Figure A-21 : Centrifuge test of ExoMars Descent Module (courtesy of Lavoshkin)...	160
Figure A-22 : Example of Sine Burst with a frequency of 15 Hz and 6 cycles at maximum load of 12g (figure taken from NESC Technical Bulletin 15-02)	163
Figure A-23 : Example of primary and secondary notching.....	171
Figure A-24 : Typical Sine excitation at spacecraft base.....	176
Figure A-25 : Example of test sequence for random vibration.....	181
Figure A-26 : Typical full level random specification	181
Figure A-27 : Rosetta in the ESTEC Large Acoustic Facility.....	184
Figure A-28 -Antenna reflector acoustic test in ESTEC acoustic facility.....	184
Figure A-29 : ATV STM-B Solar array wing in IABG reverberant chamber (Courtesy Dutch Space)	186
Figure A-30 : Typical acoustic noise specification.....	187
Figure A-31 : LISA Pathfinder Science Module structure on kinematic support for thermal distortion test.....	188

Figure A-32 : Typical temperature profile for thermal distortion test.....	189
Figure A-33 : Illustration of different courses of laser beams for LISA Pathfinder Science Module thermal distortion test.....	190
Figure A-34 : Videogrammetry measurements during LISA Pathfinder Science Module thermal distortion test.....	191
Figure A-35 : Overview of camera positions used during LISA Pathfinder Science Module thermal distortion test to generate the images of the test article .	191
Figure A-36 : Displacement of targets mounted on LPF SCM external structure for a temperature variation from +9,5°C (reference temperature) to +40,5°C ..	192
Figure A-37 : NIRSpec engineering test unit (ETU) during gravity-release test (courtesy: EADS Astrium)	194
Figure A-38 Principle of measurement of the micro-vibration generated by an equipment	195
Figure A-39 : ESA reaction wheel characterisation facility in room conditions and in with vacuum bell (mN range frequency band up to 1 kHz).....	196
Figure A-40 : Micro-vibration measurement test, indirect force characterisation	198
Figure A-41 : Example of test instrumentation for micro-vibration test at equipment level using indirect method measurement.....	199
Figure A-42 : View of test instrumentation during Water Pump Assembly (WPA) micro- vibration test at equipment level using indirect method measurement	199
Figure A-43 : Test setup for a test of equipment susceptibility to microvibrations	202
Figure A-44 : Micro-vibration measurement system of ESA ESTEC allows 6 Dof excitation and 6 Dof measurement	202
Figure A-45 : Example of configuration used for the microvibration test on MTG, by using small shakers (grey) to introduce well defined excitations on a mass dummy of a reaction wheel.....	204
Figure A-46 : Example of configurations used for the microvibration test on MTG, by using small shakers (grey) to introduce well defined excitations on a mass dummy of a reaction wheel. Force (left), and moments (centre and right)	205
Figure A-47 : SPOT4 satellite micro-vibration test	207
Figure A-48 : Typical background noise acceleration PSD	208
Figure A-49 : VVIS acceptance test time history red top surface blue – bottom input	210
Figure A-50 : ESA micro-vibration universal reference excitation unit (0,05 Hz to 10Hz, 10 µN to 5 N, 10 µNm to 1,5 Nm).....	210
Figure A-51 : Typical table for microvibration emission measurement (mN range limited frequency bandwidth)	211
Figure B-1 : Sketch of the Vacuum chamber method	215
Figure B-2 : Accumulation Leak Test set up	216
Figure B-3 : Enclosure Calibration	216
Figure B-4 : Cupola Accumulation leak test overview	216
Figure B-5 : Cupola Accumulation Leak Test He capillary leak source	217
Figure B-6 : Node 2 accumulation leak test on a joint _typical set-up	217

CEN/CLC/TR 17603-10-03:2022

Figure C-1 : View of Water Pump Assembly (WPA) test article during audible noise test at equipment level.....	227
Figure C-2 : Example of test instrumentation plan for audible noise test at equipment level	227
Figure C-3 : View of test instrumentation during Water Pump Assembly (WPA) audible noise test at equipment level.....	228
Figure C-4 : View of COLUMBUS test article (external view: seen from deck-aft perspective) during audible noise test at element level.....	230
Figure C-5 : Illustration of different microphone position inside COLUMBUS during audible noise test at element level.....	231
Figure C-6 : Picture of COLUMBUS internal microphones during audible noise test at element level.....	232
Figure D-1 : Sketch from a typical Conducted PIM test bed.....	235
Figure D-2 : Radiated PIM test bed: each carrier is transmitted via a dedicated antenna	235
Figure D-3 : Radiated PIM test bed: both carriers are transmitted by the same antenna	236
Figure D-4 : Radiated PIM test bed: both carriers are transmitted via the same antenna	236
Figure D-5 : Typical RF power profile for PIM tests: transmission carriers.....	238
Figure D-6 : Typical element (payload) inside an anechoic chamber for validation tests under nominal scenario.....	240
Figure D-7 : Test bed placed to radiate the anechoic chamber walls according to payload disposition.....	242
Figure D-8 : Radiated PIM test bed: each carrier is transmitted via a dedicated antenna	242
Figure D-9 : Radiated PIM test bed: both carriers are transmitted by the same antenna	243
Figure D-10 : Radiated PIM test bed: both carriers are transmitted via the same antenna	243
Figure D-11 : Typical RF power profile for PIM tests: transmission carriers.....	245
Figure E-1 Coordinate Systems relationship.....	252
Figure E-2 : General sketch of a laser tracker	255
Figure E-3 : Typical setup for alignment using laser tracker	256
Figure E-4 : Laser tracker axis and laser beam	256
Figure E-5 : Theodolites main components	258
Figure E-6 : Typical Theodolites	258
Figure E-7 : Measurement setup with theodolites	260
Figure E-8 : Laser Tracker environment creation.....	262
Figure E-9 : Laser tracker (Aligned to MBS) measuring theodolite line of sight.....	263
Figure E-10 : Corner Cube Reflector	263

Tables

Table 4-1: Typical EGSE/SCOE list.....	32
Table 5-1: Nomenclature for temperature cycling implementation on "type a" units.....	65
Table 5-2: Thermal vacuum step by step procedure (example n° 1 for "type a" units) .	67
Table 5-3: Thermal vacuum step by step procedure (example n° 2 for "type a" units) .	68
Table 6-1: List of typical Space segment element models on which functional tests are executed (Verification Level: Space segment element)	91
Table 6-2: List of Functional tests, Performance, Mission and Polarity Tests.....	94
Table 6-3: Typical list of test benches for functional verification on Space segment element verification level	97
Table 6-4: Typical mapping of the functional test phases with regard to test configuration	98
Table 6-5: Multipactor, RF corona and RF power occurrence versus relevant investigations at Element level	129
Table A-1 : Performances of the ESA/ESTEC MVS shaker for equipment or element testing	173
Table A-2 : Classification of noise sources affecting micro-vibration tests	209
Table D-1 : Typical RF power profile for PIM tests.....	238
Table D-2 : Typical RF power profile for PIM tests.....	245
Table D-3 : Example of PIM scenario	248
Table E-1 : Laser tracker typical performances	257
Table F-1 : List of legacy/historical test bench names	265

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European Foreword

This document (CEN/CLC/TR 17603-10-03:2022) has been prepared by Technical Committee CEN/CLC/JTC 5 “Space”, the secretariat of which is held by DIN.

It is highlighted that this technical report does not contain any requirement but only collection of data or descriptions and guidelines about how to organize and perform the work in support of EN 16603-10-03.

This Technical report (TR 17603-10-03:2022) originates from ECSS-E-HB-10-03A.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document has been developed to cover specifically space systems and has therefore precedence over any TR covering the same scope but with a wider domain of applicability (e.g.: aerospace).

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Introduction

Testing is an important part of a Space Project, because of its impact on cost and because is the most effective way to demonstrate a product functionalities and performances.

As such, this Handbook is of outmost importance in defining how the requirements can be implemented into the verification approach and in providing “real life” experience and examples in order to have an effective application into the test execution.

In order to meet this objective, the WG have tried, in preparing this Handbook, to be as exhaustive as possible in providing methods and techniques, as well as examples, in a punctual one-to-one requirement versus guideline approach.

The WG also recognized that this approach, even if punctually exhaustive, provided in most cases an unstructured definition of the tests as a whole giving a leopard spots information which may not be useful in preparing and conducting a test.

As a consequence, the WG have decided to complement the main body of the Handbook with Annexes where a structured and comprehensive test organization has been defined and described.

In those cases, testing people can find how a test is prepared, applied and executed in terms, for example, of test setup, test configuration, used instrumentation and test facilities/equipment, test preparation suggestions, safety rules to be considered, data acquisition and reporting content, together with pictures, tables and sketches of real cases,

This approach has allowed, in particular for Mechanical, Microvibration and Integrity Tests as well as for Alignment and PIM tests, to have in one shot a complete and structured set of guidelines easing the implementation of the requirements of such tests.

It is to be underlined that some of this material comes from the ECSS-E-HB-32-26 “Spacecraft mechanical load analysis handbook”, which contained a lot of information about mechanical testing.

It is worthy to pay attention that the Annexes of this Testing Guidelines do not correspond to the Annexes of the Testing Standard.

Moreover, this handbook only applies for the Revised version of the ECSS-E-ST-10-03 Standard (ECSS-E-ST-10-03C Rev.1, 31 May 2022).

1

Scope

This handbook provides additional information for the application of the testing standard ECSS-E-ST-10-03 to a space system product.

This handbook does not contain requirements and therefore cannot be made applicable. In case of conflict between the standard and this handbook, the standard prevails.

This handbook is relevant for both the customer and the supplier of the product during all project phases.

To facilitate the cross-reference, this handbook follows as much as practical, the structure of the standard even if, as written in the Introduction, some tests are described in the Annexes to allow a better comprehensive view.

Where test material is already covered in other ECSS handbook, this document refers to them instead of duplicating the information, this is the case of ECSS-E-HB-32-25 “Mechanical shock design and verification handbook” and the various parts of ECSS-E-HB-31-01 “Thermal design handbook”.

As the Standard applies to different products at different product levels of the space segment, the space segment equipment and the space segment elements. In the testing standard the requirements applicable to each level are addressed in different chapters clearly identified. The standard clearly states that it is not applicable to other segment (launch and ground) as well as software; as a consequence, no pre-tailoring matrix is needed.

Moreover, as per testing standard, this handbook does not contain guidelines for constellation programmes.

Testing aspects are derived from the verification approach covered in the ECSS-E-ST-10-02 and in its corresponding handbook ECSS-E-HB-10-02.

The application of the requirements of the standard to a particular project is intended to result in effective product verification and consequently to a high confidence in achieving successful product operations for the intended use, in this respect this handbook has the goal to help reaching these objectives.

References

EN Reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS – Glossary of terms
EN 16603-10-02	ECSS-E-ST-10-02	Space engineering - Verification
EN 16603-10-03	ECSS-E-ST-10-03	Space engineering - Testing
EN 16603-31	ECSS-E-ST-31	Space engineering - Thermal control general requirements
EN 16603-31-02	ECSS-E-ST-31-02	Space engineering – Two-phase heat transport equipment
EN 16603-32-02	ECSS-E-ST-32-02	Space engineering – Structural design and verification of pressurized hardware
EN 16603-33-11	ECSS-E-ST-33-11	Space engineering - Explosive subsystems and devices
EN 16603-35-02	ECSS-E-ST-35-02	Space engineering - Solid propulsion for spacecrafts and launchers
EN 16603-ST-40	ECSS-E-ST-40	Space engineering - Software
TR 17603-10-02	ECSS-E-HB-10-02	Space engineering - Verification guidelines
TR 17603-20-01	ECSS-E-HB-20-01	Space engineering - Multipactor handbook
TR 17603-20-07	ECSS-E-HB-20-07	Space engineering - Electromagnetic compatibility handbook
TR 17603-31-01 to TR 17603-31-16	ECSS-E-HB-31-01 (all parts)	Space engineering – Thermal design handbook
TR 17603-32-25	ECSS-E-HB-32-25	Space engineering - Mechanical shock design and verification handbook
TR 17603-32-26	ECSS-E-HB-32-26	Space engineering - Spacecraft mechanical loads analysis handbook
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance – Nonconformance control system
EN 16602-70-01	ECSS-Q-ST-70-01	Space product assurance – Cleanliness and contamination control
EN 16602-70-05	ECSS-Q-ST-70-05	Space product assurance – Non-destructive testing
EN 16602-80	ECSS-Q-ST-80	Space product assurance – Software product assurance
	NASA-STD-7012	Leak test requirement
	ATS paper_MATED Improvement (October 2018)	MATED (Model And Test Effectiveness Database) Improvement and Added Value on Industry